# TECHNICAL SPECIFICATIONS

These technical specifications address all anticipated construction and excavation activities to be completed during Bannack Detention Basin construction activities.

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# SECTION 01000
# SUMMARY OF WORK

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Related Documents
B. Summary Scope of Work
C. Measurement and Payment of Bid Items shown on Proposal

### 1.02 RELATED DOCUMENTS

A. Sheets and Figures included in Appendix A

| Section | Sheet | Drawing Title |
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| 6 | 6-1 | Final Grading and Revegetation Plan |

## 1.03 SUMMARY SCOPE OF WORK

The scope of work addressed by these plans and specifications consists of detention basin construction on Hangman's Gulch with structural embankment, discharge structure and trail realignment. Bannack State Park is a culturally significant site that hosts approximately 45,000 visitors per year. Construction access to the site will require transport of equipment and materials through a portion of the state park in close proximity to historic buildings and visitor pedestrian traffic. Any unearthed cultural significant artifacts will require collection and documentation by the State of Montana. In the event the Contractor encounters cultural artifacts during execution of the work, Contractor shall avoid disturbance of the artifacts, and immediately contact the Engineer and Bannack State Park project resource.

The Contractor or Contractors shall perform the following work per these specifications:

A. Remove a section of the Hangman's Gulch road and construct an ATV trail per the plans and specifications.

B. Construct 27 acre-feet detention basin and all associated erosion protection per plans and specifications. This includes an earthen structural embankment to temporarily detain any stormwater runoff. A concrete outlet structure with orifice plates, drop inlet spillway, trash rack, discharge conduit and concrete stilling basin.

## 1.04 ADDITIONAL RESPONSIBILITES

A. The Contractor is obligated to immediately notify the Engineer and MT FWP of construction problems in order to facilitate practical, functional and cost-effective project modifications. These problems may be associated with differing site conditions, construction staking and measurements, conflicts between plan drawings and specifications, defective materials or other issues.

## 1.05 MEASUREMENT AND PAYMENT

A. Work items for which specific unit prices are established will be measured to the nearest unit applicable. Payment for each pay item will be made at the agreed-to unit price for that item. For established lump sum work items, payment will be made at the lump sum price. Such payment will constitute full compensation for all materials, labor, equipment, tools and all other items necessary and incidental to completion of the work.

B. Compensation for any item of work shown on the Drawings or described in these specifications will be considered incidental to and included in the pay items listed on the bid schedule.

Bid Item 1- Mobilization/Demobilization/Bonding & Insurance

Mobilization shall include all activities and associated costs for transportation of Contractor's personnel, equipment, and operating supplies to the site; establishment of offices, buildings, and other necessary general facilities for the Contractor's operations at the site; premiums paid for performance and payment bonds, including coinsurance and reinsurance agreements as applicable.

Demobilization shall include all activities and costs for transportation of personnel, equipment, and supplies not required or included in the contract from the site; including the disassembly, removal and site clean-up, of offices, buildings and other facilities assembled on the site specifically for this contract.

This work includes mobilization and demobilization required by the contract at the time of award. If additional mobilization and demobilization activities and costs are required during the performance of the contract as a result of changed, deleted, or added items of work for which the Contractor is entitled to an adjustment in contract price, compensation for such costs will be included in the price adjustment for the item or items of work changed or added.

Work under this item includes:

- Mobilize and demobilize to and from the project area with all necessary equipment to complete the Work.
- Provide insurance and bonding for the Contract.
- Obtain all required permits, and provide copies to Engineer.
- Prepare and submit all preconstruction submittals to Engineer for approval.
- Provide and remove temporary offices, storage and sanitation facilities.
- Provide site security.
- Dispose of all trash and debris generated by Contractor at a state-licensed solid waste management facility.
- Provide all labor, tools, equipment, materials, and incidentals necessary to complete the Work as specified.
- Construct culvert\fill temporary stormwater channel crossing for Hangman’s Gulch.
- Construct and maintain all access and haul roads as required.
- Traffic Control.
- Re-grading of construction access and haul roads to pre-construction condition.
- Dust control during mob\demob operations

### *Measurement Bid Item 1*

No measurement will be made for Bid Item 1.

### *Payment Bid Item 1*

Payment for Bid Item 1 will be based on the lump sum amount as shown on the Bid Proposal Form. Fifty percent (50%) payment for this Bid Item will be allowed once Contractor submits Bond and Insurance Certificates, fully mobilizes to the project area,

and obtains approval on all submittals required prior to beginning Work. Full payment for this item will be allowed after Contractor completes the Work for the remainder of the Contract, completes final cleanup work, and fully demobilizes equipment and materials from the project area.

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Bid Item 2- Clearing and Grubbing

All costs including clearing, grubbing, and disposal of vegetation. All construction staking costs shall be included.

Work under this item includes:

- Clear and grub.
- Salvage and stockpile vegetative debris.
- Separate large woody debris from A horizon material.
- Stockpile A horizon (Type D Material).
- Dispose of non-vegetative debris at landfill.
- Provide all labor, tools, equipment, materials, and incidentals necessary to complete the Work as specified.
- Construction staking.
- Dust control

### *Measurement Bid Item 2*

No measurement will be made for Bid Item 2.

### *Payment Bid Item 2*

Payment for Bid Item 2 will be based on the lump sum amount as shown on the Bid Proposal Form.

Bid Item 3- Water Management and Erosion Control

Contractor responsible for all water management of site area including rerouting storm flows from Hangman's Gulch around project site area, and any groundwater dewatering required to conduct the work. Work under this bid item includes all erosion control and Best Management Practices (BMP's) All construction staking shall be included.

### *Measurement Bid Item 3*

No measurement will be made for Bid Item 3.

### *Payment Bid Item 3*

Payment for Bid Item 3 will be based on the lump sum amount as shown on the Bid Proposal Form.

Bid Item 4- Trail Construction

Contractor shall construct 1050 ft. of trail per the plans and specifications. Work includes all excavation, grading, culvert installation and backfill as shown on Drawings. All construction surveying\staking and dust control costs shall be included.

### *Measurement Bid Item 4*

No measurement will be made for Bid Item 4.

### *Payment Bid Item 4*

Payment for Bid Item 4 will be based on the lump sum amount as shown on the Bid Proposal Form.

Bid Item 5- Detention Basin Outlet Works

Contractor shall construct Detention basin outlet works as shown on the Drawings and per these specifications. Work includes:

- Construction of all reinforced, formed concrete work and appurtenant components including:
  - Orifice plates and connections
  - Guard Rails
  - Grates and supports
- Placement of pre-cast RCP outlet pipe with pre-cast end treatment and trash rack
- Construction of riprap stilling basin
- Construction staking
- Dust control

### *Measurement Bid Item 5*

No measurement will be made for Bid Item 5.

### *Payment Bid Item 5*

Payment for Bid Item 5 will be based on the lump sum amount as shown on the Bid Proposal Form.

Bid Item 6- Detention Basin Excavation

Contractor to perform all Detention Basin excavation as shown on the Drawings and per these specifications. Work includes:

- Excavation
- Excavation and stockpiling of Clay layer
- Dust Control
- Survey\Construction staking

### *Measurement Bid Item 6*

No measurement will be made for Bid Item 6.

### *Payment Bid Item 6*

Payment of Bid Item 6 will by Lump Sum (LS) amount as shown on the Bid Proposal Form

Bid Item 7 - Detention Basin Embankment

Contractor to construct detention basin structural fill embankment as shown on Drawings and per these specifications. Work includes:

- Processing of on-site material to meet embankment fill material specifications
- Placement of compacted embankment fill
- Placement of outlet pipe filter diaphragm
- Gate Installation
- Survey\Construction staking
- Dust control
- Construction of Locking Gate and appurtenant components
- All testing

### *Measurement Bid Item 7*

No measurement will be made for Bid Item 7.

### *Payment Bid Item 7*

Payment of Bid Item 7 will by Lump Sum (LS) amount as shown on the Bid Proposal Form.

Bid Item 8 - Detention Basin Embankment Toe Drain

Contractor to construct detention basin toe drain as shown on Drawings and per these specifications. Work includes:

- Excavation
- Obtaining and placing all required materials
- Survey\Construction staking
- Dust control

### *Measurement Bid Item 8*

No measurement will be made for Bid Item 8.

### *Payment Bid Item 8*

Payment for Bid Item 8 will be based on the lump sum (LS) amount as shown on the Bid Proposal Form.

Bid Item 9- Inlet Channel Erosion Protection

Contractor to install inlet channel riprap and rock apron as shown on Drawings and per these specifications. Work includes:

- Excavation
- Obtaining and placing all required materials
- Survey\Construction staking

### *Measurement Bid Item 9*

No measurement will be made for Bid Item 9.

### *Payment Bid Item 9*

Payment for Bid Item 9 will be based on the lump sum (LS) amount as shown on the Bid Proposal Form.

Bid item 10- Final Grading and Revegetation

Contractor shall perform all final grading and revegetation as shown on the Drawings and per these specifications. Work includes:

- Obtaining all required materials
- Amending stripped cover soil with Organic material to produce specified growth media
- Placing and grading growth media
- Seeding
- Placing erosion control fabric
- Placing growth media and seeding on all reclaimed haul roads and disturbed areas including stockpile areas and reclaimed access\haul roads.
- Chip large woody debris and spread chipped vegetative material.

### *Measurement Bid Item 10*

No measurement will be made for Bid Item 10.

### *Payment Bid Item 10*

Payment for Bid Item 10 will be based on the lump sum (LS) amount as shown on the Bid Proposal Form.

Bid item 11- Place Excavated Clay Layer

Contractor shall place all Clay material produced while excavating the detention basin in the bottom (sediment storage) area of the basin.

### *Measurement Bid Item 11*

No measurement will be made for Bid Item 1.

### *Payment Bid Item 11*

Payment of Bid Item 11 will by lump sum (LS) amount as shown on the Bid Proposal Form.

Bid item 12- Fencing

This item covers all labor, supplies, materials, equipment and incidentals for the removal and resetting or removal and replacement of existing fences at the Site in compliance with the Contract Documents.

### *Measurement Bid Item 12*

Measurement shall be made by the Engineer in the field after installation. The measurement shall be made on the fence along the top wire or rail and shall include the distance through double and single panels. Panels shall not be paid for separately but shall be included in the unit price for fencing. Measurement does not include gates.

### *Payment Bid Item 12*

Payment shall be at the contract unit price per lineal foot for "Fencing". Payment for this item shall constitute full payment for furnishing all labor, wire, posts, staples, tie wire and other incidental materials; and all layout grading and clearing necessary for the construction of th e fence.

Bid item 13- Hinged Metal Gate

This item includes salvage and installation of hinged metal gates at the locations shown on the Drawings.

### *Measurement Bid Item 13*

Measurement shall be made by the numerical count of the gates in place after installation.

### *Payment Bid Item 13*

This item shall be paid for at the contract unit price per each metal gate installed for "Hinged Metal Gate".

**END OF SECTION 01000**

# DIVISION 1 – GENERAL REQUIREMENTS

## SECTION 01010

## GENERAL PROCEDURES

### PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. PROGRESS MEETINGS AND SCHEDULES

B. TEMPORARY FACILITIES AND SITE CONTROL

C. SURVEYING

D. ESTIMATED QUANTITIES

E. SUBMITTALS

F. TRAFFIC CONTROL AND SITE SAFETY

G. CONSTRUCTION SEQUENCING AND OTHER CONTRACTORS

H. STORM WATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL

I. EXISTING STRUCTURES

J. RECORD KEEPING REQUIREMENTS

### 1.02 PROGRESS MEETINGS AND SCHEDULES

A. Contractor shall prepare an initial project schedule and shall update and maintain the schedule appropriately.

B. Contractor shall participate in weekly progress meetings with the Engineer, MT FWP Project Manager and Bannack State Park Staff.

### 1.03 TEMPORARY FACILITIES AND SITE CONTROL

A. Contractor shall implement an appropriate program to protect the work in progress and from theft, vandalism, and unauthorized entry.

B. Contractor shall construct temporary access roads necessary to provide unimpeded traffic for construction purposes. Contractor shall provide temporary parking areas for project personnel.

C. Contractor shall maintain all haul roads in good condition. Contractor shall provide comprehensive dust control to assure that dust levels are minimized, and to comply with stated performance standards.

D. Contractor shall notify and coordinate with all appropriate utility companies before conducting work proximate to overhead or buried utilities.

## 1.04 SURVEYING

A. Contractor shall provide all surveying, measurements and computations needed to complete the work as shown on the Drawings and these specifications.

B. The baselines and bench marks for primary control, necessary to establish lines and grades needed for construction are shown on the Drawings and have been located on the Site.

C. The Engineer will supply Digital Elevation Model electronic files, point files and alignments as needed to facilitate the construction staking.

D. These baselines and bench marks shall be used as the origin of all surveys, layouts and measurements to establish construction lines and grades. The Contractor shall take all necessary precautions to prevent the loss or damage of primary control points. Any stakes or control points lost or damaged by construction activity will be reestablished by the Contractor at the Contractor expense.

E. Contractor performed survey shall consist of all work necessary for:
   a. Establishing line and grade for all work from the Engineer established Digital Terrain Model (DTM) electronic file, Engineer supplied coordinate and elevation electronic files and the coordinates and elevations shown on the Drawings.
   b. Setting slope stakes for all work.
   c. Checking and any supplemental or interim staking.
   d. Establish final grade stakes.
   e. Performing quantity surveys, measurements, and computations for progress payments.

F. Contractor shall immediately notify the Engineer and MT FWP of any survey conflicts between the Drawings, DTM and site measurements which could result in conflicts with design quantities.

G. Construction staking required for the work item shall be completed before work on any item starts.

H. Construction survey records shall be available at all times during the progress of the work for examination and use by the Engineer. Original field notebooks and other survey records shall be provided to and become the property of the MT FWP before final payment and acceptance of all work.

I. Initiation of excavation or earthfill on the project indirectly indicates that the original topographic surface, as defined in the Engineer provided DTM electronic files has been accepted as true and accurate.

J. Compensation for surveying will be incidental to the work and included in the pay items listed on the bid schedule.

K. Progress payments will be based on the percent of the total project pay item complete.

L. As-built survey information substantiating quantities shall accompany invoices as appropriate and determined by the Engineer.

## 1.05 ESTIMATED QUANTITIES

**A. All estimated quantities stipulated in the Contract Documents are approximate and are to be used only as a basis for estimating the probable cost of the Work and for the purpose of comparing the bids submitted for the Work. Actual quantities may differ from estimated quantities. Estimated quantities are provided in Sheet 6-1 of the Drawings.**

## 1.06 SUBMITTALS

A. Contractor shall provide to Engineer complete product information and shop drawings where required for all materials and equipment proposed for incorporation into the project. Information shall include manufacturer, model or catalog designation, reference standards, complete installation instructions, and shop drawings that show dimensions and location of all parts. Information shall be submitted prior to ordering, and in a timely manner to provide Engineer time for review approval.

B. In connection with all of the activities described in these Technical Specifications, Contractor shall be responsible and shall notify appropriate representatives of any governmental laws or regulations in addition to those identified in these specifications, including those relating to environmental protection and zoning, that would regulate, prohibit or control the performance by Contractor under these Technical Specifications.

## 1.07 TRAFFIC CONTROL AND SITE SAFETY

A. Contractor shall provide all necessary temporary traffic control to complete the Work. Contractor shall develop a site-specific Traffic Control Plan in accordance with Section 01570 of these Technical Specifications.

B. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work.

C. Contractor shall hold daily safety meetings with workers, subcontractors and park staff to discuss work activities, construction traffic, potential hazards and mitigation.

## 1.08 CONSTRUCTION SEQUENCING AND OTHER CONTRACTORS

Contractor shall coordinate his construction activities with those of any and all other contractors that may be working on the site or adjacent sites. Contractor's work shall be conducted in a manner that will not impede the progress of other concurrent construction activities.

## 1.09 STORM WATER MANAGEMENT AND EROSION AND SEDIMENT CONTROL

A. Obtain all required permits for the Work prior to starting construction. All costs necessary to obtain and comply with all applicable permits is incidental to the Work.

B. Contractor shall plan and execute work to control and minimize surface runoff from cuts, fills, and other disturbed areas. Contractor shall prevent sediment and/or sediment-laden water from entering Hangman's Gulch and the flow in the channel to the extent practical. Contractor shall follow the Storm Water Pollution Prevention Plan.

## 1.10 EXISTING STRUCTURES

A. The Contractor shall notify and coordinate with all appropriate utility companies and with MTFWP to field-locate overhead or buried utilities, wells, and other existing structures prior to construction. Location, depth, size, and material of existing buried utilities within excavation limits shall be verified prior to beginning construction.

B. The Contractor shall be responsible for protecting existing structures within and external to the construction area. Any damage to existing structures, whether above or below ground level, shall be repaired to the MT FWP's satisfaction by the Contractor at no additional cost to MTFWP.

## 1.11 RECORD KEEPING REQUIREMENTS

A. Contractor shall maintain on-site, at all times, a complete set of all environmental health and safety documentation, design documents, addenda, and other modifications to the Work. The Contractor will be responsible for furnishing detailed survey notes and other working documents to Engineer if requested.

**END OF SECTION**

# SECTION 01570

# TEMPORARY TRAFFIC CONTROL

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

This section covers all labor, supplies, materials, equipment, and incidentals necessary for traffic control consisting of furnishing, installing, maintaining, and relocating traffic signs, barricades, lights, signals, pavement markings, and other traffic control devices necessary to ensure the safety of the general public and Project personnel in compliance with the Contract Documents. Work shall include flagging for the guidance of traffic through the Site and for public roadways. It is the interest of Montana State Parks to protect the historic features contained within the townsite, which is a National Historic Landmark (NHL), and provide for the safety of park visitors and staff.

### REFERENCES

Publications listed below are incorporated into this specification by reference.

**American Association Of State Highway And Transportation Officials (AASHTO)**

| | |
|---|---|
| AASHTO The Green Book | (2011) A Policy on Geometric Design of Highways and Streets, 6th Edition |

**U.S. Federal Highway Administration (FHWA)**

| | |
|---|---|
| MUTCD | (2009) Manual on Uniform Traffic Control Devices (MUTCD) |

### 1.02 SUBMITTALS

A. Prepare and submit a Traffic Control Plan for any Work involving public roadways no later than ten (10) days prior to the start of Work. The Traffic Control Plan will be subject to review and approval by the appropriate county for roads under county jurisdiction, Montana State Parks and by any other public entity having jurisdiction over other public roadways (e.g., Bureau of Land Management, city, etc.). These approvals will be in addition to that provided by Engineer in accordance with the Submittals Section. No Work may commence until all approvals of the Traffic Control Plan have been secured.

## PART 2 PRODUCTS

A. All traffic control devices and materials shall be in accordance with the most current editions of MUTCD for Streets and Highways.

## PART 3 EXECUTION

### 3.01 GENERAL

A. Provide traffic control signage and flaggers as necessary to safely complete the Work while accommodating public traffic including pedestrian and equestrian traffic within Bannack State Park. Traffic control shall conform to the standards set forth in MUTCD, current edition.

B. Schedule operations to minimize interruptions of the streets, roads, and highways involved and keep all public roads, streets, and highways open during normal working hours during the Work. Heavy equipment and heavy vehicle traffic access to the Site through Bannack State Park shall occur between the hours of 7:00 am and 10:00 am. Exceptions to this requirement may be granted upon prior approval by the Engineer and Bannack State Park. Provide uninterrupted two-way traffic for public roads at all times during overnight and weekend periods. If any of the public roads are to be closed during construction operations, give at least 14 days advance notice. Unless otherwise provided, when construction activity is in progress and total closure has not been provided for herein, delays may not exceed 10 minutes, in order to reasonably accommodate traffic.

C. Schedule construction operations in a manner to ensure that: 1) the safety and convenience of motorists, bicyclists, and pedestrians, and the safety of all personnel, are adequately met at all times; and 2) the Project is completed in a manner most beneficial to the Project as a whole. Contractor shall notify the Engineer and the Bannack State Park staff 24- hours prior to entering Bannack State Park with heavy trucks or equipment. A weekly update shall be provided to park staff and the Engineer notifying of anticipated heavy equipment traffic through the townsite.

D. Observe posted speed limits on the roads leading to the Site as well as all other public roadways. Within the townsite at Bannack State Park construction vehicles shall not exceed 5 mph. All vehicles used in the Work shall strictly comply with these limits. Observe legal and posted weight limits for roadways and bridges in all hauling activities. Contractor shall take appropriate measures to keep vibrations to a minimum within the townsite to protect historic structures.

E. All construction and Project-related traffic shall come to a complete and full stop when exiting the Site and yield the right-of-way to traffic on the public roadways, unless flagging protection is approved and implemented.

F. All bridges within the vicinity have load limits as shown on the Drawings. Contractor shall verify bridge load limits with Beaverhead County prior to mobilization and adhere to the county load limits of all bridges.

## 3.02 TRAFFIC CONTROL PLAN

A. Prepare a Traffic Control Plan including, but not limited to, the following:

1. Itemization of signs, including: type, size, shape, color and location.
2. Channelization (e.g., cones, barrels, barricades).
3. Flagging and location(s).
4. Lighting.
5. Communication.
6. Road closures and time of road closures.
7. Special traffic patterns (e.g., pilot cars, one-way traffic lanes, detours).
8. Signs during non-work hours.
9. Designated entrances to the Project area.
10. Map and descriptions of the anticipated routes.
11. Description of the anticipated haul equipment.
12. Traffic control measures for all public roads, haul routes, and Site access points.
13. Locations of all signs, markers, barricades, and other traffic control devices to be used.
14. Routing of any detours required.

## 3.03 CONSTRUCTION REQUIREMENTS

A. Provide traffic control in full compliance with MUTCD during materials hauling and equipment operation or transport along public roadways. No tracked equipment or roller/compactors shall be driven through the townsite, rubber wheels and trailers only. All equipment delivered to the site shall be free of invasive weeds.

B. Store or park construction equipment, vehicles, materials, and debris a minimum of 30 feet from the edge of the travelled way. When it is not feasible to park equipment or store materials a minimum of 30 feet from the edge of the travelled way or behind guardrail, utilize adequate warning devices and protective measures. Construction equipment should only be parked in designated areas, not within the townsite or park roads.

C. Maintain at least one-way traffic at all times with continuous passage for emergency vehicles from either direction. Delay to the public shall be no longer than 10 minutes.

D. At the conclusion of daily construction activities, ensure that necessary traffic control measures remain in effect overnight and through the weekend, including barricades around any open excavations or other hazards.

## 3.04 TRAFFIC CONTROL DEVICES

A. Before placement for any stage of construction, all traffic control devices required for that stage shall be on-hand at the Site. Properly place, install, and operate all traffic control devices necessary for construction. Obtain approval of the placement and operation from Engineer before starting construction.

B. Properly maintain, clean, and operate traffic control devices during the entire length of use.

C. Immediately remove all traffic devices no longer needed for traffic control.

D. For operations completed in stages, place only signage applicable to the present stage of construction. Remove, turn, or cover with opaque material any signage not applicable to the existing conditions, during shutdowns longer than two (2) hours, at night, when not needed on weather days, holidays, and weekends so as not to be readable to oncoming traffic.

E. Set, size, and locate signs in a manner that they are visible to the equipment operators and other vehicles as necessary.

F. All traffic control devices furnished by Contractor shall remain the property of Contractor. Repair or replace traffic control devices when damaged or destroyed by traffic or other activities, or when traffic control devices fail to function properly at no cost to MTFWP.

**END OF SECTION**

# DIVISION 2 – SITEWORK

## SECTION 02051

## MONITORING WELL DISPOSITION

## (NOT USED)

**END OF SECTION**

# SECTION 02110

# SITE CLEARING

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Removal of surface debris.

B. Clearing and grubbing of all vegetation including trees, shrubs, and grass.

## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

### 3.01 PROTECTION

A. Locate, identify, and protect existing utilities from damage.

B. Protect benchmarks, existing structures, and monitoring wells from damage or displacement.

### 3.02 CLEARING

A. Clear all surface debris and vegetation, including the root zone, from all areas impacted by the Work and as required for access to site and execution of Work as shown on the Drawings.

B. Remove identified trees, shrubs, stumps, roots, brush, rubbish, and other objectionable material within work areas and from the surfaces of all borrow areas and stockpile sites.

### 3.03 REMOVAL

A. Remove debris, rock, and extracted vegetation and dispose of materials.

B. Stockpile screened material to be used as growth media for revegetation.

**END OF SECTION**

# SECTION 02140

# CONSTRUCTION DEWATERING

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

This Section includes a description of subsurface conditions and specifies dewatering requirements and procedures necessary during installation and use of the following:

A. Dewatering Pumps and Appurtenances

B. Ground-Water Collection Trenches and Sumps

C. Dewatering Wells and/or Wellpoints

### 1.02 RELATED SECTIONS

A. Section 02220 - Excavating

### 1.03 SUBMITTALS

Not Used

### 1.04 DESCRIPTION OF SUBSURFACE CONDITIONS

A. This description of subsurface conditions at the site is based on 7 test pits and 3 boreholes drilled in the vicinity of the basin on July 6 to July 11, 2016. The field exploration logs and laboratory test results are provided in the following document (attached to these specifications as Appendix B):
   - Bannack Detention Basin – Geotechnical Engineering/Material Properties

   The conditions, classifications and descriptions provided are based on the field observations made on the date indicated on the logs. Furthermore, the standard drilling or excavation methods used during subsurface exploration may unavoidably result in limitations to the accuracy of the descriptions and observations noted.

B. General: The foundation soils generally consists of silty gravel (0 to up to 19 feet bgs) underlain by completely decomposed claystone and conglomerate. The boreholes were drilled to a depth of 28 to 61 feet bgs. During the field explorations, groundwater was present at depth of 40 feet bgs.

C. The subsurface conditions at the site may lead to unstable excavations if the excavation extends below the groundwater table and/or collects significant

amounts of precipitation/surface water runoff and proper dewatering controls are not implemented and maintained during construction.

D. Contractor may conduct additional field investigations, at their own cost with written approval from Montana State Parks.

## PART 2 PRODUCTS

### 2.01 EQUIPMENT AND MATERIALS

A. Excavation Dewatering

1. Contractor shall provide and maintain on site: all equipment, piping, fittings, and appurtenances necessary to collect, pump, and convey discharge water to adequately dewater all open excavations; and spare fittings, pumps and other necessary materials to maintain the dewatering system for continuous operation.

2. Contractor shall provide and maintain primary and backup power supplies and power distribution systems as necessary to operate the dewatering system without significant interruption. All branch circuits shall be installed to a minimum burial depth of 24 inches (direct burial cable will be permissible as well as conductor in conduit). All grounding shall be provided per the NEC. The power plants and their appurtenances shall be protected from weather and other potentially detrimental conditions at the site (e.g., dust, impacts, etc.)

B. Contractor shall provide all necessary equipment and materials to collect and pump dewatering flows.

## PART 3 EXECUTION

### 3.01 DEWATERING

A. The Contractor shall fully implement all measures and precautions necessary to ensure the safety of workers, and the protection of the Work (including maintenance of integrity against rupture and/or heave of the bottom of the excavation) during excavation and dewatering, including, but not limited to, full implementation of the requirements of this Section of the Specifications.

B. Contractor shall provide backup and spare equipment (as specified in Part 2.01), immediately available for installation and/or operation to minimize any interruption in the required pumping. In the event of pump failure for reasons beyond the Contractor's ability to control, all excavation below the water table or in locations that otherwise require active dewatering shall cease; Engineer shall be

immediately notified; and Contractor shall implement repairs and resume pumping as soon as possible.

C. All water from the dewatering operations taken from open sumps or trenches shall be routed through a sediment control BMP prior to discharging to waters of the State. Dewatering water taken from wells or wellpoints may be discharged directly into Hangman's Gulch.

**END OF SECTION**

# SECTION 02200

# EXCAVATING

## PART 1 GENERAL

### 1.01 DESCRIPTION

A. Work Included: Work under this section includes excavation of the outlet structure subgrade, detention basin, embankment subgrade and conduit pipe subgrade as presented in the Drawings.

### 1.02 RELATED SECTIONS

Section 02110 - Site Clearing
Section 02140 - Construction Dewatering
Section 02270 - Stream Channels and Diversions

### 1.03 REGULATORY REQUIREMENTS

A. Sheeting, Shoring, and Bracing: Except where trench banks are cut back on a stable slope, provide and maintain all sheeting, shoring, and bracing necessary to protect workers, and to protect adjoining grades and structures from caving, sliding, erosion or other damage in accordance with Occupational Safety and Health Standards 29 CFR Part 1926 - Construction Standards for Excavations; the Site Specific Health and Safety Plan; and other applicable codes and governing authorities.

### 1.04 FIELD MEASUREMENTS

A. Verify that survey benchmarks and intended reference elevations for the Work indicated on the Drawings are accurate as indicated. Notify Engineer of any discrepancies.

## PART 2 PRODUCTS

Not used.

## PART 3 EXECUTION

### 3.01 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Accurately locate, identify, and protect from damage all utilities, benchmarks and monitoring wells not designated for demolition. Contractor must verify that all

utilities and water lines through the work area have been accurately located prior to commencing any excavation activities.

C. Abandonment, demolition or preservation of designated monitoring wells shall be undertaken prior to construction or excavation in the areas adjacent to the wells.

D. Protect adjacent structures from damage by excavation work.

E. Contractor shall maintain the minimum utility offset, as required by the utility owner, between the utility and the excavation surface.

## 3.02 OTHER EXCAVATION

A. Grade top perimeter of excavation and other work areas to prevent surface runoff from draining into the excavation. Excavated areas shall be graded to promote surface drainage and discourage ponding prior to closure.

B. The use of explosive materials will not be permitted.

C. Excavation shall conform to the boundaries, elevations and excavation slopes shown on the Drawings.

D. Remove loose material, lumped subsoil, boulders, and loose rock from excavations leaving excavation surface exposed and clean.

E. During all excavation activities, maintain and protect monitoring wells designated to be preserved if applicable (see Drawings).

## 3.03 TOLERANCES

A. Excavate to within ± 0.3 feet of elevation and location as shown by the Drawings.

B. Maintain excavation dewatering sufficiently to allow for visual inspection and as-built surveying, and to maintain stable side slopes.

C. Excavate channels to within +/- 0.3 feet of elevation and location and within +/- 0.1% of grade as shown on the Drawings.

## 3.04 FIELD QUALITY CONTROL

A. Provide for access, visual inspection and surveying of excavation surfaces.

B. Contractor shall perform all initial control and grade staking during construction. Final compliance data will be reviewed by the Engineer.

## 3.05 PROTECTION

A. Protect excavations as required to prevent cave-in or loose soil from falling into excavation.

B. Notify Engineer of conditions encountered which appear unsafe in maintaining excavation as designated on Drawings.

**END OF SECTION**

# SECTION 02210

# FILL MATERIALS AND PLACEMENT REQUIREMENTS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

This section specifies fill materials, borrow areas/sources of fill materials, and fill placement requirements for the following:

A. Embankment Toe Drain and Diaphragm Filter.

B. Culvert Bedding

C. Embankment

### 1.02 RELATED SECTIONS

Section 02270 - Stream Channels and Diversions
Section 03300 – Cast In Place Concrete

### 1.03 SUBMITTALS

A. Submit data sheets and test results from compliance testing of materials provided by Contractor to Engineer for review and approval.

### 1.04 REFERENCES

A. Sampling and Preparation

1. ASTM D75 - Standard Practice for Sampling Aggregates.

2. ASTM D420 - Recommended Practice for Investigating and Sampling Soil and Rock.

B. Classification

1. ASTM D421 - Standard Practice for Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants.

2. ASTM D422 - Standard Method for Particle-Size Analysis of Soils.

3. ASTM D2487 - Classification of Soils for Engineering Purposes.

4. ASTM D2488 - Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).

5. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

C. Density and Moisture Content: Field

1. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.

2. ASTM D2922 - Test Methods for Density of Soil and Soil- Aggregate in Place by Nuclear Methods (Shallow Depth).

3. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

D. Density and Moisture Content: Laboratory

1. ASTM D698 or AASHTO T99 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5 lb (2.49 Kg) Rammer and 12 inch (304.8 mm) Drop.

2. ASTM D1557 or AASHTO T180 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb (4.54 Kg) Rammer and 18 inch (457 mm) Drop.

3. ASTM D2216 - Laboratory Determination of Water (Moisture) Content of Soil, Rock and Soil Aggregate Mixtures.

4. ASTM D4254 - Minimum Index Density of Soils and Calculation of Relative Density.

5. ASTM D4643 - Determination of Water (Moisture) Content of Soil, Microwave Oven Method.

6. ASTM D4718 - Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles.

## PART 2 PRODUCTS

### 2.01 SOIL MATERIALS

A. Type A Fill: Granular material, meeting the requirements of ASTM C33 fine No. 67 aggregate conforming to the following gradation criteria unless otherwise approved

by the Engineer, to be used for the filter diaphragm, pipe bedding and backfill from the filter diaphragm to the pipe outlet and toe drain as shown in the Drawings:

| Particle Size | % Finer Than |
|---|---|
| 1-inch | 100 |
| 3/4-inch | 90-100 |
| 3/8 sieve | 20-55 |
| #4 sieve | 0-10 |
| #8 sieve | 0-5 |

B. Type B Fill: Clean, granular material for pipe bedding and backfill from the outlet structure to the filter diaphragm. Type B Fill shall conform to the following gradation criteria and have a Plasticity Index less than 10, or otherwise approved by the Engineer:

| Particle Size | % Finer Than |
|---|---|
| 3-Inch | 100 |
| 1-Inch | 70-90 |
| #4 Sieve | 25-60 |
| #40 Sieve | 10-30 |
| #200 Sieve | 2-10 |

C. Type C Fill: Clean, well-graded naturally occurring soil mixture for construction of embankment and trail. Unless otherwise directed by the Engineer, Type C fill shall be obtained from on-site excavation. Excavated material may have over sized cobbles and boulders that will require removal to meet this specification. Type C Fill shall conform to the following gradation criteria and have a Plasticity Index less than 10, or otherwise approved by the Engineer:

| Particle Size | % Finer Than |
|---|---|
| 4-inch | 100 |
| 3-inch | 90-100 |
| 1 1/2-inch | 70-100 |
| #4 sieve | 25-60 |
| #40 sieve | 10-30 |
| #200 sieve | 2-12 |

D. Type D Material: Type D material is defined as topsoil (A horizon material) and subsoil (B horizon material). If present and unless otherwise directed by the Engineer, Type D material shall be stripped from all proposed disturbed areas within the project limits to a depth of 0.5 foot measured from the top of ground surface following clearing and grubbing. Stripped Type D material shall be stockpiled on site in an area where it will not interfere with construction activities. The cover soil stockpile shall be of such uniformity and dimensions it can be conveniently measured by cross-section.

E. Type E Organic Material: Type E material including aged manure or organic compost shall be from an Engineered approved source. Organic material shall be mixed with Type D material to produce Type F Growth Media. Type E material shall meet the following criteria:

| Specification | Reporting Method | Threshold Value | Units | Test Method** |
|---|---|---|---|---|
| **Wet Bulk Density** | Pounds/cubic yard on as received material | Report Value, No Spec | lbs/cy | Test Methods for the Examination of Composting and Compost (TMECC) Test Method 03.01-C - Bulk Density |
| **Moisture Content** | Percent on as received sample | 48 max* | % | Test Methods for the Examination of Composting and Compost (TMECC) Test Method 03.09-A - Moisture Content at 70$^{o}$C |
| **Organic Matter** | Percent Organic Matter as dry weight basis | 45 min | % | Test Methods for the Examination of Composting and Compost (TMECC) Test Method 02.02 - Laboratory Sample Preparation, Methods 02.02-C, 02.02-D, and 02.02-E and TMECC Test Method 05.07A-Loss on Ignition (at 550$^{o}$C) |
| **Gradation** | Percent passing 1" in diameter | 100 | % | Test Methods for the Examination of Composting and Compost (TMECC) Test Method 02.02-B - Sample Sieve |
| **Carbon:Nitrogen Ratio** | Ration C:N | 18-25:1 | | Test Methods for the Examination of Composting and Compost (TMECC) Test Method 05.02-A Carbon to Nitrogen Ratio |
| **Soil Fertility** | NPK | | N:P:K | Test Methods for the Examination of Composting and Compost (TMECC). Nitrogen: Test Method 04.02-B - Nitrate Nitrogen; 04.03-B Water Soluble Phosphorus; 04.04-B Water-Soluble Potassium |
| **Compost Class** | Class A or B | Class A | | Defined by US EPA CFR Part 503 |

F. Type F Growth Media –Type F growth media shall consist of a mixture of Type D material and Type E Organic material to be placed as shown on the Drawings. Type E Organic material shall be mixed with Type D material at a rate of 125 wet tons per acre.

## 2.02 SOURCE QUALITY CONTROL

A. Tests and analyses of soil materials will be performed in accordance with applicable ASTM test methods, as listed under Part 1.04 unless otherwise specified.

B. If tests indicate materials do not meet specified requirements, change material and retest.

C. Compliance testing will be requested by Engineer at their discretion.

# PART 3 EXECUTION

## 3.01 SOURCE OF MATERIALS

A. Contractor shall be responsible for locating a suitable source of Type A, Type B and Type E Organic material.

B. Type C Fill shall be obtained from on site as specified in Part 2.01 C

C. Type D Fill shall be salvaged on site as specified in Part 2.01 D

## 3.02 PREPARATION FOR PLACEMENT

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect utilities that remain from damage, including all monitoring wells not designated for demolition. Notify utility companies for utilities which may be affected by the work, or which cross the work area.

D. Protect bench marks and existing structures from excavating equipment and vehicular traffic.

E. Compact subgrade or existing underlying fill to a minimum depth of 12 inches to meet density requirements for subsequent fill materials as specified in Part 3.04. This requirement does not apply to embankments, dikes or roads placed over soft sediments. In the case of embankments placed over soft sediments, compaction should be to the maximum attainable without degradation of the subgrade that

would affect later fill placement. The Engineer shall be solely responsible for this determination.

F. Cut out soft areas of subgrade or existing underlying fill that cannot be compacted as specified in paragraph E, above, as approved by engineer. Backfill with material type specified for subsequent fill, and compact to minimum density requirements for subsequent fill material as specified in Part 3.04.

G. Under Embankment cut out areas of subgrade containing organics to a depth of 6 inches, or as approved the by the Engineer. Backfill with material type specified for subsequent fill and compact to minimum density requirements for subsequent fill material as specified in Part 3.04.

H. Dewater area as needed prior to fill placement. Unless directed by Engineer, fill may not be placed if groundwater or ponded surface water is present.

## 3.03 PLACEMENT

A. General Backfilling of Excavated Areas and Other General Non-Structural Fill

1. Place fill in lifts not to exceed 3 feet in loose thickness. Thinner lifts must be used if required to achieve compaction criteria presented in Part 3.04 paragraph A, below.

2. Finish grade to within $\pm$ 0.2 foot of line and $\pm$ 0.1 % of grade shown on the Drawings.

3. Maintain positive surface drainage to minimize ponding of water on fill.

4. Material shall not be frozen when placed. Material shall not be placed on ice. Material shall not be placed on frozen material unless directed by Engineer. Frozen material shall be scarified, disked, or otherwise made suitable to receive subsequent fill and provide an acceptable bond between lifts, as approved by Engineer.

B. Backfilling of Outlet Structure

1. Place fill in lifts not to exceed 12 inches in loose thickness. Thinner lifts must be used if required to achieve compaction criteria presented in Part 3.04, below. Construct each layer of fill continuously and approximately horizontal for the width and length of such portion at the elevation of the layer. Fill shall be ramped against the outlet structure walls and conduit on a slope of 6H:1V to help force the earthfill against the wall and conduit. Rollers should be used in a direction parallel to the wall and conduit. Fill should be maintained at approximately the same elevation of both sides of

outlet structure and conduit during backfill. Do not allow water to pond on prepared foundation or fill surfaces.

2. Finish grade to within ± 0.3 feet of line

3. Material shall not be frozen when placed. Material shall not be placed on ice. Material shall not be placed on frozen material unless directed by Engineer. Frozen material shall be scarified, disked, or otherwise made suitable to receive subsequent fill and provide an acceptable bond between lifts, as approved by Engineer.

4. Do not place fill adjacent to structures before the concrete has attained sufficient strength to withstand the applied construction loads. No fill material shall be placed against structure walls until the concrete has attained 75% of the compressive strength per Division 3 of these specifications.

5. Special Compaction: Use hand operated vibrating plate compactors having a minimum static weight of 300 pounds and a minimum dynamic force of 1,000 pounds, or other special compaction equipment acceptable to the Engineer to obtain the compaction specified in areas closer than 2 feet from structures. Use special compaction equipment in locations where other compactors cannot operate effectively.

C. Diaphragm Filter

1. Fill shall be placed with spreader boxes in horizontal lifts not to exceed 12 inches in loose thickness.

2. At no place shall the dimensions be smaller than those given in the Drawings or stated in the Specifications. Equipment crossovers shall be limited to not more than two at any given level of the embankment. Each crossover shall be cleaned of all contaminating materials to the satisfaction of the engineer and approved by the engineer before additional materials are placed in this area.

3. Finish grade to within ± 0.3 foot of line shown on Drawing.

4. Material shall not be frozen when placed. Material shall not be placed on ice. Material shall not be placed on frozen material unless directed by Engineer. Frozen material shall be thawed, scarified, disked or otherwise made suitable to receive subsequent fill and provide an acceptable bond between lifts, as approved by the Engineer.

D. Embankment.

1. All surfaces upon or against which embankment fill will be placed, including previously placed and compacted layers, shall be free of all objectionable materials in accordance with Section 02110 - Site Clearing, shall be relatively flat in preparation for subsequent fill placement, shall be moist but free of standing or ponded water, unless otherwise approved by the Engineer, and shall be scarified as necessary so as to provide a suitable bond between the existing and subsequently placed material.

2. Place fill of type designated on Drawings in lifts not to exceed 12 inches in loose thickness. This requirement may be waived by the Engineer and lifts up to 2 feet in loose thickness may be allowed for the first lift over soft subgrade.

3. Finish grade to within $\pm$ 0.3 foot of line shown on the Drawings for embankment slopes, and within + 0.3 foot on embankment crests.

4. Maintain positive surface drainage to prevent ponding of water on fill.

5. Material shall not be frozen when placed. Material shall not be placed over ice. Material shall not be placed on frozen material unless directed by Engineer. Frozen material shall be thawed, scarified, disked or otherwise made suitable to receive subsequent fill and provide an acceptable bond between lifts, as approved by Engineer.

6. When the embankment is constructed against a hillside or where new fill is to be placed against an existing embankment, all loose debris and materials must first be cleared and scraped from the existing surface. Bench or step the original embankment by cutting into it horizontally a minimum distance of 12 inches or two (2) times the largest size particle in the fill being places, whichever is greater. Cut each bench as close to the one below it as the ground slope will permit to provide a secure bond between the new and existing materials. The height of each bench shall not exceed 6 inches.

7. Add water to fill prior to compaction to obtain the Optimum Moisture Content required to achieve satisfactory compaction unless otherwise specified. Use moisture addition procedures, as approved by the Engineer. Moisture shall be evenly distributed throughout the fill material.

8. Provide hand-operated compaction equipment in areas closer than 2 feet from structures (for special compaction).

E. Pipe Bedding and backfill from outlet structure to filter diaphragm (Type B Fill).

1. All surfaces upon or against which Type B Fill will be placed, including previously placed and compacted layers, shall be free of all objectionable materials in accordance with Section 02110 - Site Clearing, shall be relatively flat in preparation for subsequent fill placement, shall be moist but free of standing or ponded water, unless otherwise approved by the Engineer, and shall be scarified as necessary so as to provide a suitable bond between the existing and subsequently placed material.

2. Place fill of type designated on Drawings in lifts not to exceed 12 inches in loose thickness.

3. Finish grade to within $\pm$ 0.2 foot of line and $\pm$ 0.1 % of grade shown on the Drawings.

4. Maintain positive surface drainage to prevent ponding of water on fill.

5. Material shall not be frozen when placed. Material shall not be placed over ice. Material shall not be placed on frozen material unless directed by Engineer. Frozen material shall be thawed, scarified, disked or otherwise made suitable to receive subsequent fill and provide an acceptable bond between lifts, as approved by Engineer.

6. Add water to fill prior to compaction to obtain the Optimum Moisture Content required to achieve satisfactory compaction unless otherwise specified. Use moisture addition procedures, as approved by the Engineer. Moisture shall be evenly distributed throughout the fill material.

7. Special Compaction: Use hand operated vibrating plate compactors having a minimum static weight of 300 pounds and a minimum dynamic force of 1,000 pounds, or other special compaction equipment acceptable to the Engineer to obtain the compaction specified in areas closer than 2 feet from structures. Use special compaction equipment in locations where other compactors cannot operate effectively.

F. Placing Crushed Aggregate (Type A Fill)

1. Mix the aggregate and adjust the moisture content to obtain a uniform mixture with moisture content suitable for compaction. Spread and shape the mixture on the prepared surface in a uniform layer.

2. Do not place the mixture in a layer exceeding 6 inches in compacted thickness. When more than one layer is necessary, compact each layer according to Part 3.04 before placing the next layer.

3. Finish grade to within ± 0.2 foot of line and ± 0.1 % of grade shown on the Drawings.

4. Maintain positive surface drainage to minimize ponding of water on fill.

5. Material shall not be frozen when placed. Material shall not be placed on ice.

6. Material shall not be placed on frozen material unless directed by Engineer. Frozen material shall be scarified, disked, or otherwise made suitable to receive subsequent fill and provide an acceptable bond between lifts, as approved by Engineer.

G. Organic Material

1. Organic material shall be hauled to the project site and stockpiled in designated areas as shown on the Drawings. Organic material shall be applied and spread uniformly over designated areas shown on the Drawings according to the application rates specified in 2.01 E.

2. The Contractor shall incorporate the organic material uniformly to a depth of 6 inches unless otherwise directed by the Engineer. At least two passes with a disc or other equipment should be completed at angles as close to perpendicular as the terrain allows to achieve full mixing to the required depth. Alternate mixing methods, as approved by the Engineer, may be considered.

## 3.04 COMPACTION

A. General Backfilling of Excavated Areas and Other Non-Structural Fill Density: Materials shall be compacted sufficiently to support traffic by construction equipment, construction surveying, and inspection vehicles.

B. Filter Diaphragm, pipe bedding and backfill material from filter diaphragm to pipe outlet and toe drain:

1. Place Type A material by dumping from a height no less than 1 foot and no greater than 5 feet. Spread material evenly with rake or shovel to ensure uniform distribution of material throughout area of backfill. Mechanically tamp a minimum of three passes with the tamper.

C. Embankment, Trail and Pipe bedding and backfill material from outlet structure to filter diaphragm:

1. Moisture Content: The moisture content, as determined by ASTM D2216, shall be between ± 2 % of the optimum moisture content as determined by ASTM D698. The moisture content shall be uniform throughout the lift. Placed materials not meeting this requirement, as determined by testing by Contractor, shall be scarified to a depth of 1 foot, wetted or dried as necessary to meet this requirement, and mixed to uniform water content.

2. Density: Material shall be compacted to a minimum of 95% of the maximum dry density as determined by ASTM D698.

## 3.05 SITE GRADING

A. Grade all areas including excavated, filled, and transition areas to obtain the finished surface shown on Drawings, to the tolerances specified in Part 3.03 above. Finished surface shall be reasonably smooth, compacted, and free from irregular surface changes. Finished surfaces shall have positive drainage to prevent ponding of water.

## 3.06 FIELD QUALITY CONTROL

A. Testing for compaction control and gradation will be conducted by the Contractor in accordance with these specifications. Testing to be performed at a minimum every 1000 CY of structural fill or every lift. Embankment not meeting the requirements of these specifications shall be corrected.

B. Contractor shall perform all initial control and grade staking during construction. Final compliance data will be reviewed by Engineer. Contours and elevations not meeting the requirements of these specifications shall be corrected.

**END OF SECTION**

# SECTION 02220

# TRENCH EXCAVATION AND BACKFILL

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

Work under this section includes site preparation, earthwork and surface restoration for underground pipe and appurtenances as shown on the Drawings and specified herein, including the discharge conduit and road culvert.

### 1.02 RELATED SECTIONS

Section 02210 - Fill Materials and Placement Requirements
Section 02200 - Excavating
Section 02620 - Corrugated Metal Pipes and Outlet Works

### 1.03 SUBMITTALS

A. Submit the following to Engineer:

B. Certificates of Compliance: Furnish certification that standards specified herein are met.

### 1.04 REFERENCES

A. Backfilling and Compaction: Reference Standards as listed in Section 02210.

### 1.05 DEFINITIONS

A. Pipe Bedding Material: Fill placed under, beside and directly over the pipe prior to subsequent backfill operations, as shown on the Plans.

### 1.06 CLASSIFICATION OF EXCAVATED MATERIALS

A. No classification of excavated materials will be made. Perform excavation of every description and of whatever materials encountered to the depths indicated.

## PART 2 PRODUCTS

### 2.01 BACKFILL MATERIALS

A. Pipe Bedding and Backfill Material - Type A Granular Bedding Material, as specified in Section 02210.

B. Pipe Bedding and Backfill Material - Type B Fill Material, as specified in Section 02210.

C. Type C, Clean Backfill, as specified in Section 02210.

D. Overexcavation - Type C Fill as specified in Section 02210 shall be used as directed by Engineer to replace soft, spongy, or otherwise unsuitable material encountered in the trench bottom.

## PART 3 EXECUTION

### 3.01 PREPARATION

A. Surface Improvements: Protect from damage or restore to their original condition all surface improvements encountered during trenching. Improvements shall include but not be limited to surfacing, utilities, monitoring wells, signs, and fencing.

B. Underground Obstructions:

1. Before commencing work, obtain information concerning location, type, and extent of all existing utilities on the site.

2. Protect from damage any underground pipes, utilities, or structures encountered during construction. Restore any damaged underground obstructions to their original condition.

3. All obstructions exposed during trenching shall be inspected by Engineer prior to backfilling. Contractor shall be responsible for providing adequate notice (minimum of 24 hours) to Engineer for inspections.

C. Sheeting, Shoring, and Bracing: Provide and maintain sheeting, shoring, and bracing as necessary to protect workmen, and adjoining grades and structures from caving, sliding, erosion, or other damage in accordance with Occupational Safety and Health Standards 29 CFR Part 1926 - Construction Standards for Excavations, the Site Specific Health and Safety Plan, and other applicable codes and governing authorities.

D. The use of explosives will not be permitted.

E. Drainage: Maintain the excavations free from water throughout the work. Remove any water encountered in the trench to provide firm subgrade, to permit joints to be made dry at the final grade, and to prevent entrance of water into the pipeline.

F. Protection: Protect from excavation equipment and vehicular traffic all bench marks, existing structures, monitoring wells, fences, pavements, above and below-grade utilities that are to remain, and other features that are to remain.

G. Field Measurements: Initial survey staking of the location and elevation of the proposed structures shall be provided by Contractor prior to commencing excavation.

H. Construction Staking: The Contractor shall be responsible for all construction staking during construction activities.

## 3.02 EXCAVATION

A. Trenching: Excavate trenches by open cut. Conform to sheeting, shoring, and bracing requirements of OSHA, and other applicable codes and governing authorities.

B. Stockpiling Excavated Materials: Stockpile Suitable Materials along the trench at a safe distance in accordance with Occupational Safety and Health Administration (OSHA) Regulations, and other applicable codes and governing authorities. Remove excavated materials not suitable or required for backfilling, as directed by Engineer.

C. Excavation to Grade: Accurately grade trench bottoms to provide uniform bearing and support for pipe and pipe bedding material. Remove stones larger than three inches as necessary to avoid point bearing.

D. Unstable Pipe Subgrade: Cut out wet or soft areas encountered in the bottom of the trench which are not capable of in-situ compaction. Backfill to grade with Type C Fill, as directed by Engineer. Compact in accordance with compaction requirements for Structural Fill in Section 02210.

E. Limiting Trench Widths: Conform to the Pipeline Bedding details shown on the Drawings. Cut trenches sufficiently wide to enable installation and allow inspection. Minimum trench width shall be 3 feet.

F. Unauthorized Excavation:

1. If the trench depth is over-excavated, backfill such over-excavation with Type C Fill as directed by Engineer and compact in accordance with compaction requirements for Embankments and Structural Fill in Section 02210.

2. If the maximum trench width is exceeded provide higher strength pipe, as approved by Engineer.

## 3.03 BEDDING PLACEMENT

A. Refer to bedding details shown on the Drawings.

B. Granular bedding material shall be placed by hand or other careful manner so as not to damage or disturb pipe, in maximum layers of 6-inches loose thickness, and thoroughly compacted by tamping. Special care shall be taken to assure complete compaction under the haunches of the pipe.

C. Bedding shall be compacted in accordance with Section 02210, Part 3.04.

## 3.04 TRENCH BACKFILLING AND COMPACTION

A. Place and compact Type A Granular Bedding Material, and Type C Fill in accordance with Drawings and placement and compaction requirements specified in Section 02210, Part 3.04.

B. Mechanically compact trench backfill by means of tamping rollers, pneumatic tire rollers, vibrating rollers, or other mechanical tampers as approved by Engineer. Compaction by jetting will not be permitted.

C. Compaction compliance testing will be performed by Contractor in accordance with Section 02210, Part 3.06.

## 3.05 SURFACE RESTORATION

A. Replace and repair any surface improvements damaged or removed, as directed by Engineer.

B. Reshape and re-compact fills subjected to vehicular traffic during construction as necessary to meet lines, grades and compaction requirements.

**END OF SECTION**

# SECTION 02270

# STREAM CHANNELS AND DIVERSIONS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

This Section includes all grading, excavation, and backfill required for all storm drainage and channel modification construction needed to complete the Work. This shall include furnishing, hauling and placing riprap material; and furnishing, placing and constructing riprap aprons for stilling basin.

### 1.02 RELATED SECTIONS

Section 02210 - Fill Materials and Placement Requirements
Section 02710 - Geosynthetic Materials

### 1.03 SUBMITTALS

Submit the following to the Engineer:

A. Materials Source/Product Data: Submit material source and manufacturer specifications on items proposed for use and as specified herein.

B. Laboratory Test Results: Submit data sheets and test results from compliance testing of materials supplied by Contractor to the Engineer for review.

### 1.04 REFERENCES

Codes and Standards: Comply with provisions of following, except as otherwise indicated:

A. Montana Department of Highways and the Montana Highway Commission, "Section 613, Slope and Bank Protection, Standard Specifications for Road and Bridge Construction, Montana."

B. AASHTO - M147 - Materials for Aggregate and Soil-Aggregate.

C AASHTO T11 and T27 or ASTM C136 - Methods for Sieve Analysis of Fine and Coarse Aggregates

D. ASTM D75 - Standard Practice for Sampling Aggregates.

E. ASTM D422 - Standard Method for Particle-Size Analysis of Soils.

F. For Backfill and Compaction - Reference standards as listed in Section 02210, Part 1.04.

## PART 2 PRODUCTS

### 2.01 RIPRAP

Riprap shall be installed at the locations and to the dimensions indicated on the Drawings. The stone shall be hard, durable, subrounded to angular in shape, resistant to weathering to water and to ice action; free of excess amounts of thin flat, and elongated pieces, free from overburden, spoil, shale, structural defects, and organic material. Neither breadth nor thickness of a single stone shall be less than 1/3 its length. The smaller stone shall be uniformly distributed throughout the work. The rock shall be manipulated by hand or machine methods sufficiently to secure a uniform surface and mass stability. Bulk specific gravity, saturated surface dry (SSD) shall not be less than 2.64. Riprap shall conform to the following gradation:

| RIPRAP CLASS GRADATIONS | | | | |
|---|---|---|---|---|
| **Class** | **Weight of Stone[2] (pounds)** | **Equivalent Spherical Diameter (feet)** | **% Of Total Weight That Must Be Smaller Than Given Size** | |
| 1 | 100<br>60<br>25<br>2 | 1.05<br>0.88<br>0.66<br>0.27 | 100<br>70<br>40<br>0 | 100<br>90<br>60<br>10 |
| 2 | 700<br>500<br>200<br>20 | 2.00<br>1.79<br>1.32<br>0.61 | 100<br>70<br>40<br>0 | 100<br>90<br>60<br>10 |
| 3 | 2,000<br>1,400<br>700<br>40 | 2.82<br>2.53<br>2.00<br>0.77 | 100<br>70<br>40<br>0 | 100<br>90<br>60<br>10 |

### 2.02 RIPRAP BEDDING MATERIAL

Not Used

### 2.03 SOURCE QUALITY CONTROL

A. Tests and analysis of soil and riprap materials will be performed in accordance with applicable ASTM test methods.

B. If tests indicate materials do not meet specified requirements, change material and retest.

C. Compliance testing will be as requested by Engineer.

## PART 3 EXECUTION

### 3.01 SOURCE OF MATERIALS

A. Contractor is responsible for locating suitable sources of riprap.

### 3.02 OTHER STORM FLOW DIVERSIONS

A. Other storm flow diversions may be constructed as needed to trap sediment and direct flows using Best Management Practices (BMPs). BMPs may include, but are not limited to, construction of temporary berms, sediment basins, ditches and channels. Such diversions and BMPs must be adequate to meet the requirements of the Montana General Permit for Storm Water Discharges Associated with Construction Activity. Temporary storm runoff control BMPs may include, but are not limited to, silt fencing, straw bales, straw mulch, hydroseeding, and erosion control matting. Such measures must be implemented prior to beginning work in areas which would be impacted by storm flows.

### 3.03 EXCAVATION

A. All excavation for diversions or stream channel modifications shall meet with the specifications of Section 02200.

### 3.04 BERM CONSTRUCTION

A. Construction of all dikes for diversions or ditches shall meet with the specifications of Section 02210 related to embankments and structural fills.

### 3.05 RIPRAP

A. Geotextile filter fabric shall be placed beneath the riprap in accordance with the details shown in the Drawings.

B. Placement of riprap shall start at the toe of the slope and proceed up the slope. The riprap shall be placed such that damage to the bedding layer or filter fabric does not occur. Riprap shall not be dropped onto the bedding or geotextile from a height of more than one foot. Bedding or geotextile displaced or otherwise damaged during placement shall be replaced as directed by Engineer.

C. Placement of riprap for aprons shall follow the same installation procedures as previously mentioned. Geotextile shall be placed and anchored in accordance with specifications listed in Section 02710, the manufacturer's recommendations, and the details shown on the Drawings.

D. Any placement position other than those described above shall not be executed without Engineer approval. During operation of the excavator, the operator and observers shall be looking for signs of bank stability. Such signs include, but are not limited to,: 1) tension cracks near working area; 2) signs of active bank slumping and bulging; and 3) changes in seepage around work pads and face of slope. If signs of instability are observed, work shall cease in the area of concern, until recommencement of work is approved by Engineer.

## 3.06 LOW-WATER CROSSINGS, WASHOUT DIKES

Not Used

**END OF SECTION**

**SECTION 02275**

**RENO MATTRESS**

**(NOT USED)**

**END OF SECTION**

# SECTION 02561

# PIPE AND PIPE FITTINGS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

Work Included: Work under this section includes furnishing and installing pipe and fittings. Furnish pipe and fittings complete with all jointing materials for the following:

A. Outlet Structure discharge piping as shown on the Drawings.

### 1.02 RELATED SECTIONS

Section 02220 – Trench Excavation and Backfilling.

### 1.03 QUALITY ASSURANCE

A. Pipe and Fitting Marking: Mark pipe with the following information applied at intervals of not more than 5 feet:

Nominal size and O.D. base.
Material code designation.
Applicable dimension ratio, pressure class or schedule number.
Applicable standard designation number.
Manufacturer's name or trade mark.

B. Reference Standards: Standards listed hereunder and referenced elsewhere in these specifications shall become a part of this specification and are incorporated herein by reference. This latest edition, amendment or supplement thereto in effect 30 days before date of invitation shall apply.

1. American Society for Testing and Materials (ASTM):

ASTM C 76 Standard Specification for Reinforced Concrete Culverts, Storm Drain, and Sewer Pipe

ASTM C 361 Standard Specifications for Reinforced Concrete Low-Head Pressure Pipe

ASTM C 443 Standard Specifications for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets

ASTM C 1619 Standard Specification for Elastomeric Seals for Joining Concrete Structures

## 1.04 SUBMITTALS

Submit the following in accordance with Section 01000 - General Requirements:

A. Certificates: Submit manufacturer's certification that materials meet specification requirements.

## 1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect pipe from impact, bending, compression or abrasion during handling and storage.

B. Store pipe on flat surface which provides even support for the pipe barrel. Do not stack pipe higher than 5 feet.

C. Ship rubber gaskets in cartons and store in a clean area away from grease, oil, ozone producing electric motors, heat and the direct rays of the sun.

D. Use nylon sling to handle pipe. The use of hooks or bare cables will not be permitted.

# PART 2 PRODUCTS

## 2.01 PIPE MATERIALS

A. Reinforced Concrete Pipe (RCP). Reinforced concrete pipe shall be Class IV pipe, unless otherwise specified on the Drawings or approved by the Engineer

1. Pressure Pipe and Fittings (48")

| | |
|---|---|
| Class: | IV |
| Conformance: | ASTM C 361 |
| Joints: | ASTM C 443 |
| Acceptable Product: | Forterra o-ring gasketed joint RCP or approved equal. |

B. Poly Vinyl Chloride (PVC) Pipe

1. Pipe and Fittings (6”)

Conformance: ASTM D1785
Joints: NA
Acceptable Product : Pacific Plastics: Drain Sch40 Perforated White Solvent Weld

# PART 3 EXECUTION

## 3.01 INSPECTION

A. Examine the pipe and fittings for cracks, dents, abrasions or other flaws prior to installation. Mark rejected piping with a yellow crayon and remove rejected piping from the project within 24 hours.

## 3.02 INSTALLATION

A. Cutting Pipe:

1. Cut pipe square with saws or pipe cutters designed specifically for the material. Protect the pipe and fittings from serrated holding devices and abrasion.

2. Wipe off all dust and dirt from the jointing surfaces and remove cuttings from interior of pipe or tubing.

3. Treat pipe ends in accordance with the manufacturer's recommendations.

B. Jointing the Pipe:

1. Joints in pipe shall be made in accordance with manufacturer's printed instructions and recommendations for specific method used.

2. Install flange coupling joints in accordance with manufacturer’s printed instructions and recommendations for specific use. Care shall be taken during bolting operations to insure no restraints are present on the pipe which would prevent uniform gasket compression or which would cause uneven stress in the flanges. Do not assemble mechanical connections until all flanged joints affected thereby have been tightened. Alternately tighten bolts spaced 180 degrees apart at a uniform rate to assure uniform gasket compression.

C. Installation of piping:

1. Piping shall be installed in accordance with the manufacturers printed instructions.

2. Where piping bends are identified on Drawings, care shall be exercised to install piping in a manner which properly secures supports and prepares piping to enable pipe curvature without incurring kinking. Kinked or otherwise damaged pipe shall be removed from the project site.

**END OF SECTION**

# SECTION 02620

# CORRUGATED METAL PIPES AND OUTLET WORKS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

Work under this section includes furnishing and installing corrugated metal pipe, fittings, jointing materials and appurtenances as shown on the Drawings and specified herein including the following:

A. Road Culvert.

### 1.02 RELATED SECTIONS

Section 02210 - Fill Materials and Placement Requirements.
Section 02220 – Trench Excavation and Backfilling.
Section 02270 - Stream Channels and Diversions.

### 1.03 SUBMITTALS

Submit the following to Engineer:

A. Product Data: Submit manufacturer specifications on manufactured items specified herein proposed for use.

B. Certificates of Compliance: Furnish certification that standards specified herein are met.

### 1.04 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO)

1. AASHTO M36 - Zinc Coated Corrugated Iron or Steel Culverts and Underdrains

2. AASHTO M218 - Zinc Coated (galvanized) Iron or Steel Sheets for Culverts and Underdrains

B. American Society for Testing and Materials (ASTM)

1. ASTM C443 - Specifications for Joints for Circular Concrete Sewer and Culvert Pipe Using Rubber Gaskets

2. ASTM A444 - Steel Sheet, Zinc Coated (galvanized) By the Hot-Dip Process, for Culverts and Underdrains

C. Federal Specifications (Fed. Spec.)

1. Fed. Spec. TT-P-641 Zinc Dust-Zinc Oxide Primer Coating

## 1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Handle pipe and accessories carefully to protect from damage. Use nylon slings or rope for handling pipe. Store pipe in a safe manner. Handle and store pipe to prevent damage to coatings and linings.

# PART 2 PRODUCTS

## 2.01 PIPE AND FITTINGS

A. Conformance: AASHTO M36, size and shape as shown on the Drawings, zinc coated steel and as specified below

B. Seam Construction: Fabricated with helical corrugations and lockseams from end to end of each length of pipe section.

C. Corrugations: The configuration of the pipe corrugations shall be helical with a pre-formed end finish. The corrugations shall form smooth continuous curves and tangents. The radii of curvature of any corrugation profile shall be at least one-half the depth of the corrugation. Corrugation for pipe furnished shall be 2 2/3" x ½" for pipes up to 36 inches and shall be 3" x 1" for pipes 36 inches and larger.

D. End Finish: Each end of each length of welded seam helical pipe shall be reformed to provide a minimum of two (2) annular corrugations.

E. Pipe Gage: The nominal thickness of any steel pipe used shall be a minimum 16 gage unless otherwise indicated on the Drawings.

F. Repair of Damaged Spelter Coating: Units on which the spelter coating has been burned by welding or otherwise damaged in fabrication shall be regalvanized, or wire brushed and painted with a zinc dust oxide paint conforming to Federal Specification TT-P-641. Regalvanizing shall be done by the hot dip process or by the metalizing process.

G. Dimensional Tolerance: Dimensional tolerance of pipe furnished shall conform to Section 8, AASHTO M218, except for the size and shape of the pipe ends. Adjacent ends of pipe shall be within ½" of each other in diameter or 1%, whichever is greater.

## PART 3 EXECUTION

### 3.01 INSPECTION

A. Examine pipe and coatings for damage. Repair damaged pipe, coatings, and fittings. Material which cannot be repaired to original condition will be rejected by Engineer and shall be removed from the site by the Contractor and replaced.

### 3.02 INSTALLATION

A. Install pipe in conformance with the line and grade shown on the Drawings. Bedding and backfill shall conform to the detail shown on the Drawings and to Section 02220 – Trench Excavation and Backfilling.

**END OF SECTION**

# SECTION 02710

# GEOSYNTHETIC MATERIALS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

This section includes product specifications for geotextile materials, storage and handling guidelines, and installation procedures for geotextiles, geogrids and geomembranes used for the following:

A. Subgrade improvement and filter fabric beneath embankment.

B. Filter fabric around blanket toe drain.

### 1.02 RELATED SECTIONS

Section 22010 - Fill Materials and Fill Placement Requirements.

### 1.03 SUBMITTALS

Submit the following to Engineer:

A. Product Data: Submit catalog data or brochures or manufactured items specified herein proposed for use.

B. Certificates of Compliance: Furnish certification that standards specified herein are met.

### 1.04 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. D 570 - Standard Test Methods for Water Absorption of Plastics.
   2. D 5199 - Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes.
   3. D 1907 - Test Method for Yarn Number by Skein Method.
   4. D 2256 - Test Method for Breaking Strength and Elongation of Yarn by Single Strand Method.
   5. D 3786 - Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics.
   6. D 4354 - Practice for Sampling of Geosynthetics for Testing.
   7. D 4355 - Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus).
   8. D 4439 - Terminology for Geotextiles.
   9. D 4595 - Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.

10. D 4632 - Test Method for Grab Breaking Load and Elongation of Geotextiles.
11. D 4759 - Practice for Determining the Specification Conformance of Geosynthetics.
12. D 4873 - Guide for Identification, Storage, and Handling of Geotextiles.
13. D 5035 - Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Force)
14. D 5261 - Test Method for Measuring Mass Per Unit Area of Geotextiles.
15. D 6524 - Measuring the Resiliency of Turf Reinforcement Mats.
16. D 6525 - Measuring Nominal Thickness of Permanent Erosion Protection Products.
17. D 6566 - Measuring Mass per Unit Area of Turf Reinforcement Mats.
18. D 6818 - Ultimate Tensile Properties of Turf Reinforcement Mats.

B. Federal Test Method of America (FTMA) CCC-5-191B - Smolder Resistance of Textile Materials.

C. Geosynthetic Accreditation Institute (GAI) - Laboratory Accreditation Program (LAP).

D. International Standards Organization (ISO) 9002 - Quality System Certification.

E. Light Projection Analysis - Lumite Test Method for Measuring Light Projection Through Fabric.

## PART 2 PRODUCTS

### 2.01 GEOTEXTILE

A. Type A Geotextile: Type A Geotextile shall be a nonwoven geotextile with a minimum puncture resistance of 110 pounds (ASTM D-4833). Geotextile shall be a PROPEX Geotex 801 or an Engineer approved equivalent.

B. Type B Geotextile: Type B Geotextile shall be a coir fabric machine produced mat of 100% coconut fiber covered on the top and bottom sides with a heavyweight photodegradable polypropylene netting. . Type B Geotextile shall meet the requirements in Table 1.

**TABLE 1 TYPE B GEOTEXTILE**

| Property | Test Method | Criteria |
|---|---|---|
| Thickness | ASTM D6525 | 0.22 inch |
| Tensile Strength (MDxTD) | ASTM D6818 | 472.8 x 225.6 lbs./ft |
| Mass/Unit Area | ASTM D6475 | 7.73 oz./sq.yd. |
| Light Penetration | ASTM D6567 | 16% |
| Unvegetated Shear | ASTM D6460 | 2.25 lbs/sq. ft |
| Water Absorption | ASTM D1117 | 167% |
| Roll Width | Measured | 2.44 meters (8.0 feet) |

Type B Geotextile shall be a North American Green EroNet C125 Erosion Control Blanket or an Engineer Approved equal.

**2.02 GEOGRID**

Not used

**2.03 GEOMEMBRANE**

Not used

**2.04 GEOWEB**

Not used

**2.05 PRODUCT DELIVERY, STORAGE AND HANDLING**

A. Packaging: Each roll of geosynthetic material shall be packaged individually in a suitable sheet, wrapper or container to protect the fabric during normal storage and handling, from damage due to ultraviolet light, and moisture.

B. Labeling: Each roll shall be identified by a tag or label securely affixed to the outside of the roll on one end. The label shall include the manufacturer or supplier, the style number and the roll number.

C. Storage: Store all geosynthetic materials elevated off the ground and ensure that they are adequately covered.

D. Geosynthetics damaged during transport, storage or placement shall be replaced.

**2.06 EROSION PROTECTION MATERIAL**

Not used

**2.07 ACCESSORIES**

Not used

**PART 3 EXECUTION**

**3.01 SITE PREPARATION**

A. The area to be covered by the geotextile shall be graded to a smooth condition free from protruding objects such as rocks, sticks and other debris. Maximum care must be taken to remove all objects that would damage the geosynthetic.

B. Grade and compact areas receiving geotextile and/or geomembrane material as required by Section 02210 – Fill Materials and Placement.

C. Remove large rocks, soil clods, vegetation, and other sharp objects that could keep geosynthetic erosion protection material from intimate contact with subgrade.

## 3.02 INSTALLATION

A. Geotextile

1. Geotextile general placement

a. The geotextile shall be spread immediately ahead of the covering operation. The geotextile shall be laid smooth and pulled taut without excessive wrinkles. The geotextile shall not be dragged through mud or over sharp objects which could damage the geotextile.

b. Overlap adjacent panels a minimum of 2 feet or as specified by the manufacturer.

c. Pegs, pins, or the manufacturer's recommended method shall be used as needed to hold the geotextile in place until the specified cover material is placed.

## 3.03 REPAIRS AND SPECIAL INSTALLATION

A. Should the geotextile be torn or punctured, the damaged area shall be repaired or replaced to manufacturer's specifications by the Contractor. The repair shall consist of a patch of the same type material.

B. Geotextile patching shall overlap the existing geotextile a minimum of 3 feet from the edge of any part of the damaged area.

C. For silt fence, a new section of silt fence shall be installed of sufficient length to span, at a minimum, two posts. New section of material shall be joined to existing by sewing.

D. For geomembrane repairs follow the manufacturer’s recommended instructions.

## 3.04 CONTROL SAMPLING

Engineer's representative may randomly select and obtain samples of geosynthetics from rolls and samples seams after arrival at the site and prior to installation. The minimum sample size from a roll shall be 1.5 yards by the full roll width.

**END OF SECTION**

## SECTION 02824

## REMOVE AND REPLACE FENCE

### PART 1 GENERAL

### 1.04 SECTION INCLUDES

This section covers all labor, supplies, materials, equipment and incidentals for the removal and resetting or removal and replacement of existing fences at the Site in compliance with the Contract Documents.

### PART 2 PRODUCTS

NOT USED

### PART 3 EXECUTION

### 3.01 REMOVE FENCE

A. Remove existing fence from the locations shown on the Drawings and as marked in the field by ENGINEER. Salvage the removed fence materials as specified or dispose.

B.

C. Remove all fence posts by pulling or digging out of the ground. Do not break off or bend posts.

D.

E. Collect and dispose of all wire, staples, and miscellaneous fence.

F.

G. Stockpile all materials to be salvaged at the locations determined by ENGINEER or as shown on the Drawings. Roll and tie off or neatly stack all salvaged fencing.

### 3.02 RESET FENCE

A. Carefully remove and store all usable materials of the existing fence on the Site. In addition to usable material from the existing fence, use new fence materials of a type and quality as similar as practical to the existing fence.

B. Do not use bent, rotten or broken posts or rusty, unusable wire. Reject all galvanized materials that show serious abrasions or broken coating.

C. The limits of existing fence to be removed and reset is shown on the Drawings or marked in the field by ENGINEER.

### 3.03 REPLACE FENCE

A. Remove existing fence and replace with new fence at the locations shown on the Drawings and as marked in the field by ENGINEER.

B. Salvage the removed fence materials as specified or dispose.

**END OF SECTION**

# SECTION 02910
# SEEDING AND TILLAGE

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. This section includes ground surface preparation, furnishing all seeding, mulch, labor, equipment, and materials to revegetate the areas impacted during construction activities, temporary diversion channels, permanent stream channel alterations, and/or other areas shown on the Drawings and described in the contract documents.

B. Unapproved areas of disturbance which are disturbed by the Contractor's operation will also require seeding and mulching. Any such disturbed areas will be considered as site damage and will not be measured or considered for payment.

### 1.02 RELATED SECTIONS

Section 02110 – Site Clearing
Section 02200 – Excavation
Section 02210 – Fill Materials and Placement Requirements
Section 02270 – Stream Channels and Diversions

### 1.03 SUBMITTALS

A. Submit the following to Engineer: Certificates of Compliance: Furnish certification that standards specified herein are met.

## PART 2 PRODUCTS

### 2.01 SEED MIXTURES

A. Type A seed mix shall be certified weed-free seed and meet the following criteria or an Engineer approved equivalent:

| Common Name | Scientific Name | Percent of Mix | Variety | LBS/PLS per AC* |
|---|---|---|---|---|
| Canada wildrye | Elymus canadensis | 8% | | 2 |
| Thickspike wheatgrass | Elymus lanceolatus ssp. Lanceolatus | 16% | Bannock or Critana | 3 |
| Slender wheatgrass | Elymus trachycaulum | 11% | Copperhead | 2 |
| Sheep fescue | Festuca ovina | 12% | | 0.5 |
| Great Basin wildrye | Leymus cinereus | 14% | Trailhead or Washoe | 3 |
| Big bluegrass | Poa secunda | 16% | High Plains | 0.5 |
| Beardless bluebunch wheatgrass | Pseuddoroegneria spicata | 16% | Whitmar | 4 |
| Regreen® | Triticum aestivum x Elytrigia elongata | 6% | | 15 |
| **Total** | | **100.00%** | | **30.00** |

* Drill Seed Rate - Double rate for broadcast seeding.

C. Do not use wet, moldy or otherwise damaged seed in the work.

## 2.02 GROWTH MEDIA

A. Use growth media as specified in Section 02210. Cover soil shall be loose, friable, soil, free of excess acid and alkali. Assure cover soil does not contain objectionable amounts of sod, hard lumps, large rocks, or other undesirable material that would form a poor seedbed.

# PART 3 EXECUTION

## 3.01 GROWTH MEDIA

A. Place at least 6 – loose inches of Type F growth media in all areas to be seeded.

## 3.02 ALLOWABLE SEEDING MONTHS

A. Perform seeding when the temperature and moisture are favorable to germination and plant growth. Seed preferably before June 1 and after October 1 of each year. Seeding dates must be approved by MT FWP.

## 3.03 SEEDBED PREPARATION, SOWING AND MULCHING

A. Clear the areas to be seeded of all debris, vegetation, and other material as determined by the Engineer to be detrimental to the preparation of the seedbed. The ground surface shall be brought to the lines and grades shown on the Drawings to blend with the adjacent topography at the completion of grading. The cover soil shall be brought to a friable condition as directed by the Engineer. A disk, harrow or other implement approved by the Engineer shall be used. Assure the prepared seedbed surface is firm enough to prevent seed loss from high winds or normal rainfall. If rolling is required, perform rolling before seeding using a suitable roller, of a weight appropriate to the soil conditions.

B. Sow seed in the areas described in these specifications and contract documents at the specified application rates.

**END OF SECTION**

**DIVISION 3 - CONCRETE**
**SECTION 03300**

# CAST-IN-PLACE CONCRETE

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 03210 Reinforcing Steel

### 1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture.

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

### 1.03 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Material test reports.

C. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.

### 1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

C. Codes and Standards: Comply with provisions of following codes, specifications, and standards, except where more stringent requirements are shown or specified:

1. ACI 318: Building Code Requirements for Reinforced Concrete.

2. ACI 301: Standard Specifications for Structural Concrete.

3. Concrete Reinforcing Steel Institute (CRSI): Manual of Standard Practice.

## 1.05 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

## 1.06 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1.

1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 305.1 (ACI 305.1M).

# PART 2 - PRODUCTS

## 2.01 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301 (ACI 301M).
2. ACI 117 (ACI 117M).

## 2.02 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

## 2.03 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

C. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.

D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

## 2.04 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I/II,.
2. Fly Ash: ASTM C 618, Class C or Type F

B. Normal-Weight Aggregates: ASTM C 33/C 33M, graded.

1. Maximum Coarse-Aggregate Size: 1- inch (19 mm) nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C 260/C 260M.

D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

E. Water: ASTM C 94/C 94M.

## 2.05 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

## 2.06 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).

B. Cementitious Materials: Limit use of fly ash to not exceed 25 percent of cement content by weight.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.

## 2.07 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Normal-Weight Concrete:

1. Minimum Compressive Strength: 4500 psi (31 MPa) at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Slump Limit: 3” for slabs and footings, 4 inches (100 mm) for walls, columns, and beams, before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1--inch (38-mm) nominal maximum aggregate size.

## 2.08 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## 2.09 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.01 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M).

C. Chamfer exterior corners and edges of permanently exposed concrete.

### 3.02 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

### 3.03 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

### 3.04 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.

C. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

## 3.05 WATERSTOP INSTALLATION

A. Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions.

## 3.06 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 309 (ACI 301M).

C. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

D. Cold-Weather Placing: Comply with provisions of ACI 306 and as follows:

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

2. Do not use frozen materials or materials containing ice or snow.

3. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

4. Do not use calcium chloride, salt, and other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

E. Hot-Weather Placing: When hot weather conditions exist that would seriously impair quality and strength of concrete, place concrete in compliance with ACI 305 and the following:

1. Cool reinforcing steel so steel temperature will not exceed the ambient air temperature immediately before embedment in concrete.

2. Fog spray forms, reinforcing steel, and subgrade just before concrete is placed.

3. Upon prior approval by the Engineer, use water-reducing retarding admixture as needed due to high temperatures, low humidity, or other adverse placing conditions.

## 3.07 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view,.

C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a

texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

## 3.08 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 (ACI 301M) for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later

and apply a second coat. Maintain continuity of coating and repair damage during curing period.

E. Structure wall shall cure for a minimum of 3 days and until achieving a required compressive strength of 3500 psi prior to backfilling. Backfilling of structure wall shall be conducted to avoid or minimize the potential for unbalanced stresses against the structure wall.

## 3.09 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.

## 3.010 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. General: Contractor shall conduct sampling and testing for quality control during placement of concrete. Testing shall be conducted by an ACI certified concrete technician. Results of the testing shall be submitted to the Engineer. Testing shall include the following:

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.

2. Slump: ASTM C 143. Conduct test every day of placement for every 25 cy and more frequently if batching appears inconsistent. Conduct with strength tests.

3. Air Content: ASTM C 231 pressure method. Conduct with slump test.

4. Concrete Temperature. Conduct with slump tests.

5. Compression Test Specimen: ASTM C 31. One set of 4 cylinders per day and every 100 cy for each class of structural concrete.

6. Compressive Strength Tests: ASTM C 31. Test one cylinder at 3 days or 7 days and two at 28 days. One additional field cure cylinder test shall be made when in-situ strengths are desired at a different time period. One cylinder shall be used as a duplicate.

7. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

8. Additional Tests: When test results indicate specified concrete strengths and other characteristics do not conform with those specified herein, the Engineer may require additional tests of in-place concrete. The Contractor shall pay for such additional tests. Additional tests may include tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42.

**END OF SECTION**

# DIVISION 5 – METALS

## SECTION 05110

## SHEET PILING

## (NOT USED)

**END OF SECTION**

# SECTION 05120

# STRUCTURAL STEEL FRAMING

## PART 1 – GENERAL

### 1.01 SUMMARY

A. Section Includes:

1. Structural steel.

2. Grout.

B. Related Requirements:

1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.

### 1.02 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

### 1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.

### 1.04 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer fabricator testing agency.

B. Welding certificates.

C. Mill test reports for structural steel, including chemical and physical properties.

D. Source quality-control reports.

E. Field quality-control and special inspection reports.

### 1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD. AISC Certification is waived for this project provided that the

steel fabricator has a minimum of 5 years steel fabrication experience on projects of similar size and complexity.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE. AISC Certification is waived for this project provided that the contractor has a minimum of 5 years steel erection experience on projects of similar size and complexity.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

D. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.

2. AISC 360.

3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

## PART 2 - PRODUCTS

### 2.06 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M.

B. Channels, Angles-Shapes: ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M.

D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.

E. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.

F. Welding Electrodes: Comply with AWS requirements.

### 2.07 BOLTS, CONNECTORS, AND ANCHORS

A. Threaded Rods: ASTM A 36/A 36M.

1. Finish: Plain.

### 2.08 PRIMER

A. Primer: Comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

B. Primer: SSPC-Paint 25, Type I, zinc oxide, alkyd, linseed oil primer.

C. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

## 2.09 GROUT

A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

## 2.010 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.

## 2.011 SHOP CONNECTIONS

A. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

## 2.012 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).

2. Surfaces to be field welded.

3. Surfaces of high-strength bolted, slip-critical connections.

4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).

5. Galvanized surfaces.

6. Surfaces enclosed in interior construction.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."

2. SSPC-SP 3, "Power Tool Cleaning."

3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

## 2.013 SOURCE QUALITY CONTROL

A. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.

2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.

3. Ultrasonic Inspection: ASTM E 164.

4. Radiographic Inspection: ASTM E 94.

B. Prepare test and inspection reports.

# PART 3 - EXECUTION

## 3.014 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.015 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.

2. Weld plate washers to top of baseplate.

3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.

4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

## 3.016 FIELD CONNECTIONS

A. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

2. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.

3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

## 3.017 FIELD QUALITY CONTROL

A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.

2. Verify weld materials and inspect welds.

3. Verify connection materials and inspect high-strength bolted connections.

B. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

**END OF SECTION**